

WHAT IS CLAIMED IS:

1. A method for manufacturing graphite powder, comprising the steps of:

5 pulverizing raw graphite, to produce pulverized graphite;  
sieving said pulverized graphite for obtaining graphite powder having maximum particle diameter of 100 $\mu$ m;

immersing said graphite powder into an acidic solution as an immersion treatment;

10 washing with water;

neutralizing; and

drying.

2. A method for manufacturing graphite powder as claimed in claim

15 1, wherein said acidic solution contains at least one compound selected from a group consisting of sulfuric acid, nitric acid, perchloric acid, phosphoric acid, and fluoric acid.

3. A non-aqueous secondary battery, comprising:

20 a positive electrode,

a negative electrode, and

electrolytic solution, which is charged or discharged by repeating a reaction of intercalating and deintercalating ions at said positive electrode and said negative electrode, respectively, wherein

said graphite powder composing said negative electrode has a  
5 particle size equal to or smaller than 100  $\mu\text{m}$ , and

said negative electrode comprises graphite powder having a fraction of a rhombohedral structure equal to or less than 20% by weight.

4. A non-aqueous secondary battery as claimed in claim 3, wherein  
10 said graphite powder has a fraction of a hexagonal structure equal to or more than 80% by weight.

5. A non-aqueous secondary battery, comprising:  
a positive electrode,  
15 a negative electrode, and  
electrolytic solution, which is charged or discharged by repeating a reaction of intercalating and deintercalating ions at said positive electrode and said negative electrode, respectively, wherein

said graphite powder composing said negative electrode has a  
20 particle size equal to or smaller than 100  $\mu\text{m}$ , and

said negative electrode comprises graphite powder having a

fraction of a rhombohedral structure equal to or less than 10% by weight.

6. A non-aqueous secondary battery as claimed in claim 5, wherein  
said graphite powder has a fraction of a hexagonal structure equal to or more  
5 than 90% by weight.

7. A non-aqueous secondary battery, comprising:  
a positive electrode,  
a negative electrode, and  
10 electrolytic solution, which is charged or discharged by repeating a  
reaction of intercalating and deintercalating ions at said positive electrode and  
said negative electrode, respectively, wherein  
said negative electrode comprises graphite powder having a  
particle size equal to or smaller than 100  $\mu\text{m}$ ,  
15 said graphite powder has both a hexagonal structure and a  
rhombohedral structure, and  
said graphite powder has a fraction of the rhombohedral structure  
equal to or less than 20% by weight, and a fraction of the hexagonal structure  
equal to or more than 80% by weight.

8. A non-aqueous secondary battery, made by a method comprising

the steps of:

laminating electrodes with graphite for a positive electrode and  
with a lithium group oxide for a negative electrode; and

enclosing said electrodes laminated with graphite into a cell vessel

5 with an electrolyte solution, wherein

said electrodes laminated with graphite are manufactured by the  
steps of:

pulverizing the graphite to graphite powder having a particle size  
equal to or smaller than 100  $\mu\text{m}$ ,

10 treating said graphite powder by heating at 900°C or higher, after  
said pulverizing, and

fabricating said graphite electrodes by subjecting the heat-treated  
graphite powder to pressing.

15 9. A non-aqueous secondary battery according to claim 8, wherein  
said treating said graphite powder by heating is performed so as to modify  
crystallinity of the graphite powder such that a fraction of the graphite powder  
having rhombohedral structure is equal to or less than 20% by weight.

20 10. A non-aqueous secondary battery according to claim 9, wherein, in  
said treating said graphite powder by heating, said crystallinity of the graphite

powder is modified so that a fraction of the graphite powder having hexagonal structure is equal to or greater than 80% by weight.

11. A non-aqueous secondary battery according to claim 9, wherein  
5 crystallinity of the graphite powder is modified during the heat treatment so that a fraction of the graphite powder having rhombohedral structure is equal to or less than 10% by weight.

12. A non-aqueous secondary battery, made by a method comprising  
10 the steps of:

laminating electrodes with graphite for a positive electrode and  
with a lithium group oxide for a negative electrode; and

enclosing said electrodes laminated with graphite into a cell vessel  
with an electrolyte solution , wherein

15 said electrodes laminated with graphite are manufactured by the  
steps of:

pulverizing the graphite to graphite powder having a particle size  
equal to or smaller than 100 $\mu$ m,

immersing said graphite powder into an acidic solution as an  
20 immersing treatment, said acidic solution containing at least one compound  
selected from a group consisting of sulfuric acid, nitric acid, perchloric acid,

phosphoric acid and fluoric acid, and then washing said graphite powder with water, neutralizing, and drying said graphite powder, and

fabricating said electrodes laminated with graphite by subjecting the dried graphite powder to pressing.

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13. A method of manufacturing a lithium secondary battery, comprising the steps of:

laminating electrodes with graphite for a positive electrode and with a lithium group oxide for a negative electrode; and

10 enclosing said electrodes laminated with graphite into a cell vessel with an electrolyte solution, wherein

said electrodes laminated with graphite are manufactured by the steps of:

pulverizing the graphite to graphite powder having a particle size  
15 equal to or smaller than  $100\mu\text{m}$ ,

treating said graphite powder by heating at  $900^{\circ}\text{C}$  or higher, after said pulverizing, and

fabricating said electrodes laminated with graphite by subjecting the heat-treated graphite powder to pressing.

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14. A method of manufacturing a lithium secondary battery,

comprising the steps of:

laminating electrodes with graphite for a positive electrode and  
with a lithium group oxide for a negative electrode; and

enclosing said electrodes laminated with graphite into a cell vessel

5 with an electrolyte solution, wherein

said electrodes laminated with graphite are manufactured by the  
steps of:

pulverizing the graphite to graphite powder having a particle size  
equal to or smaller than  $100\mu\text{m}$ ,

10 immersing said graphite powder into an acidic solution as an  
immersing treatment, washing said graphite powder, neutralizing said graphite  
powder, and drying said graphite powder, and

fabricating said electrodes laminated with graphite by subjecting  
the dried graphite powder to pressing.

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15. A method of manufacturing a lithium secondary battery according  
to claim 14, wherein said acidic solution contains at least one compound  
selected from a group consisting of sulfuric acid, nitric acid, perchloric acid,  
phosphoric acid and fluoric acid.

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16. A method of manufacturing a lithium secondary battery,

comprising the steps of:

fabricating graphite electrodes by subjecting graphite powder to pressing;

laminating said graphite electrodes with a lithium group oxide; and

5 enclosing said graphite electrodes into a cell vessel with an

electrolyte solution, wherein

said graphite powder is manufactured by a method comprising the steps of:

graphitizing raw graphite by heating raw graphite to at least  
10 2000°C, to produce graphitized raw graphite;

pulverizing said graphitized raw graphite, to produce pulverized graphite;

sieving said pulverized graphite for obtaining graphite powder having a maximum particle diameter of 100 $\mu$ m; and either

15 (a) heating said graphite powder as a heat treatment for transforming the crystalline structure to hexagonal structure, and further heating said graphite powder, at a higher temperature than said heat treatment for transforming the crystalline structure, for eliminating impurities; or

(b) immersing said graphite powder into an acidic solution as an  
20 immersing treatment, washing with water, neutralizing and drying.



17. A non-aqueous secondary battery manufactured by the process of claim 16.

18. A method of manufacturing a non-aqueous secondary battery,  
5 comprising the steps of:  
laminating graphite electrodes with a lithium group oxide; and  
enclosing said graphite electrodes into a cell vessel with an  
electrolyte solution, wherein  
said graphite electrodes are manufactured by the steps of:  
10 granulating the graphite to graphite powder having a particle size  
equal to or smaller than  $100\mu\text{m}$ ,  
(a) treating said graphite powder by heating at  $900^{\circ}\text{C}$  or higher, after  
said granulating, or  
(b) immersing said graphite powder into an acidic solution as an  
15 immersing treatment, washing said graphite powder, neutralizing said graphite  
powder, and drying said graphite powder, and  
after said (a) treating or said (b) immersing, fabricating said  
graphite powder electrodes by subjecting the heat-treated graphite powder to  
pressing.

20 19. A non-aqueous secondary battery manufactured by the process of  
claim 18.